

Department of Energy

§ 430.23

(i) Office of the Federal Register Information Center, 800 North Capitol Street, NW., Suite 700, Washington, DC.

(ii) U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Hearings and Dockets, "Test Procedures for Fluorescent and Incandescent Lamps," Docket No. EE-RM-94-220-IF, Forrestal Building, 1000 Independence Avenue, SW, Washington, DC 20585.

(3) Standards incorporated by reference may be obtained from the following sources:

(i) American National Standards Institute, 1430 Broadway, New York, NY 10018, (212) 642-4900.

(ii) Illuminating Engineering Society of North America, Publications Department, 345 E. 47th Street, New York, NY 10017, (212) 705-7925.

(iii) International Commission on Illumination, Bureau Central De La CIE, 4 AV. Du Recteur-Poincare, 75 782 Paris, Cedex 16, France.

(4) *List of standards incorporated by reference.*

1. ANSI C78.1-1991, "for Fluorescent Lamps—Rapid-Start Types—Dimensional and Electrical Characteristics"
2. ANSI C78.2-1991, "for Fluorescent Lamps—Preheat-Start Types—Dimensional and Electrical Characteristics"
3. ANSI C78.3-1991, "for Fluorescent Lamps—Instant-Start and Cold-Cathode Types—Dimensional and Electrical Characteristics"
4. ANSI C78.375-1991, "for Fluorescent Lamps—Guide for Electrical Measurements"
5. ANSI C82.3-1983 "for Reference Ballasts for Fluorescent Lamps"
6. International Commission on Illumination (CIE), Publication No. 13.2 1974, corrected reprint 1993, "Method of Measuring and Specifying Color Rendering Properties of Light Sources," ISBN 3 900 734 39 9
7. Illuminating Engineering Society of North America (IES) LM-9-88, "IES Approved Method for the Electrical and Photometric Measurements of Fluorescent Lamps"
8. Illuminating Engineering Society of North America LM-16-84, "IES Practical Guide to Colorimetry of Light Sources"
9. Illuminating Engineering Society of North America LM-20-1982, "IES Approved Method for Photometric Measuring and Reporting Tests on Reflector Type Lamps"

10. Illuminating Engineering Society of North America LM-45-91, "IES Approved Method for Electrical and Photometric Measurements of General Service Incandescent Filament Lamps"

11. Illuminating Engineering Society of North America LM-58-83, "IES Guide to Spectroradiometric Measurements"

12. Illuminating Engineering Society of North America LM-66-1991, "IES Approved Method for the Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps"

(b) *Reference materials*—(1) *General.* The references listed in paragraph (b)(2) of the section are referred to in the DOE test procedures and elsewhere in 10 CFR part 430 but are not incorporated by reference. These sources are given here for information and guidance.

(2) *List of References.*

1. National Voluntary Laboratory Accreditation Program Handbook 150-01, "Energy Efficient Lighting Products, Lamps and Luminaires, August 1993." National Voluntary Laboratory Accreditation Program, NIST, Gaithersburg, MD.

2. "Illuminating Engineering Society Lighting Handbook," 8th Edition, New York, NY 1993.

[59 FR 49474, Sept. 28, 1994]

§ 430.23 Test procedures for measures of energy consumption.

(a) *Refrigerators and refrigerator-freezers.* (1) The estimated annual operating cost for electric refrigerators and electric refrigerator-freezers without an anti-sweat heater switch shall be the product of the following three factors: (i) The representative average-use cycle of 365 cycles per year, (ii) the average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.2 of appendix A1 of this subpart, and (iii) the representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(2) The estimated annual operating cost for electric refrigerators and electric refrigerator-freezers with an anti-sweat heater switch shall be the product of the following three factors: (i) The representative average-use cycle of 365 cycles per year, (ii) half the sum of

the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just prior to shipping, each in kilowatt-hours per cycle, determined according to 6.2 of appendix A1 of this subpart, and (iii) the representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(3) The estimated annual operating cost for any other specified cycle type for electric refrigerators and electric refrigerator-freezers shall be the product of the following three factors: (i) The representative average-use cycle of 365 cycles per year, (ii) the average per-cycle energy consumption for the specified cycle type, determined according to 6.2 of appendix A1 to this subpart, and (iii) the representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(4) The energy factor for electric refrigerators and electric refrigerator-freezers, expressed in cubic feet per kilowatt-hour per cycle, shall be—

(i) For electric refrigerators and electric refrigerator-freezers not having an anti-sweat heater switch, the quotient of (A) the adjusted total volume in cubic feet, determined according to 6.1 of appendix A1 of this subpart, divided by (B) the average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.2 of appendix A1 of this subpart, the resulting quotient then being rounded off to the second decimal place, and

(ii) For electric refrigerators and electric refrigerator-freezers having an anti-sweat heater switch, the quotient of (A) the adjusted total volume in cubic feet, determined according to 6.1 of appendix A1 of this subpart, divided by (B) half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the fac-

tory just prior to shipping, each in kilowatt-hours per cycle, determined according to 6.2 of appendix A1 of this subpart, the resulting quotient then being rounded off to the second decimal place.

(5) The annual energy use of electric refrigerators and electric refrigerator-freezers equals the representative average use cycle of 365 cycles per year times the average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.2 of appendix A1 of this subpart.

(6) Other useful measures of energy consumption for electric refrigerators and electric refrigerator-freezers shall be those measures of energy consumption for electric refrigerators and electric refrigerator-freezers which the Secretary determines are likely to assist consumers in making purchasing decisions which are derived from the application of appendix A1 of this subpart.

(b) *Freezers.* (1) The estimated annual operating cost for freezers without an anti-sweat heater switch shall be the product of the following three factors: (i) The representative average-use cycle of 365 cycles per year, (ii) the average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.2 of appendix B1 of this subpart, and (iii) the representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(2) The estimated annual operating cost for freezers with an anti-sweat heater switch shall be the product of the following three factors: (i) The representative average-use cycle of 365 cycles per year, (ii) half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just prior to shipping, each in kilowatt-hours per cycle, determined according to 6.2 of appendix B1 of this subpart, and (iii) the representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary, the resulting product then

Department of Energy

§ 430.23

being rounded off to the nearest dollar per year.

(3) The estimated annual operating cost for an other specified cycle type for freezers shall be the product of the following three factors: (i) The representative average-use cycle of 365 cycles per year, (ii) the average per-cycle energy consumption for the specified cycle type, determined according to 6.2 of appendix B1 of this subpart and (iii) the representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(4) The energy factor for freezers, expressed in cubic feet per kilowatt-hour per cycle, shall be—

(i) For freezers not having an anti-sweat heater switch, the quotient of (A) the adjusted net refrigerated volume in cubic feet, determined according to 6.1 of appendix B1 of this subpart, divided by (B) the average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to or 6.2 of appendix B1 of this subpart, the resulting quotient then being rounded off to the second decimal place, and

(ii) For freezers having an anti-sweat heater switch, the quotient of (A) the adjusted net refrigerated volume in cubic feet, determined according to 6.1 of appendix B1 of this subpart, divided by (B) half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat switch in the position set at the factory just prior to shipping, each in kilowatt-hours per cycle, determined according to or 6.2 of appendix B1 of this subpart, the resulting quotient then being rounded off to the second decimal place.

(5) The annual energy use of all freezers equals the representative average-use cycle of 365 cycles per year times the average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.2 of appendix B1 of this subpart.

(6) Other useful measures of energy consumption for freezers shall be those measures of energy consumption for freezers which the Secretary deter-

mines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix B1 of this subpart.

(c) *Dishwashers.* (1) The estimated annual operating cost for dishwashers not having a truncated normal cycle as defined in 1.5 of appendix C to this subpart shall be—

(i) When electrically-heated water is used, the product of the following three factors: (A) The representative average-use cycle of 322 cycles per year, (B) the total per-cycle energy consumption for the normal cycle as defined in 1.3 of appendix C to this subpart in kilowatt-hours per cycle, determined according to 4.4 of appendix C to this subpart, and (C) the representative average unit cost in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year, and

(ii) When gas-heated or oil-heated water is used, the product of: The representative average use cycle of 322 cycles per year times the sum of (A) the product of the per-cycle machine electrical energy consumption for the normal cycle in kilowatt-hours per cycle, determined according to 4.3 of appendix C to this subpart, times the representative average unit cost in dollars per kilowatt-hours as provided by the Secretary plus (B) the product of the per-cycle water energy consumption for gas-heated or oil-heated water for the normal cycle, in Btu's per cycle, determined according to 4.2 of appendix C to this subpart, times the representative average unit cost in dollars per Btu for gas or oil, as appropriate, as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(iii) When cold water (50 °F) is used, the product of the following three factors:

(A) The representative average use cycle of 322 cycles per year times,

(B) The product of the per-cycle machine electrical energy consumption for the normal cycle in kilowatt-hours per cycle, determined according to 4.3 of appendix C to this subpart, and

(C) The representative average unit cost in dollars per kilowatt-hours as

provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(2) The estimated annual operating cost for dishwashers having a truncated normal cycle as defined in 1.5 of appendix C to this subpart shall be—

(i) When electrically-heated water is used, the product of the following three factors: (A) The representative average use cycle of 322 cycles per year, (B) one-half the sum of (1) the total per-cycle energy consumption for the normal cycle as defined in 1.3 of appendix C to this subpart plus (2) the total per-cycle energy consumption for the truncated normal cycle as defined in 1.5 of appendix C to this subpart, each in kilowatt-hours and determined according to 4.4 of appendix C to this subpart, and (C) the representative average unit cost in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year, and

(ii) When gas-heated or oil-heated water is used, the product of: The representative average use cycle of 322 cycles per year times the sum of (A) one-half the product of the per-cycle machine electrical energy consumption for the normal cycle as defined in 1.3 of appendix C to this subpart, determined according to 4.3 of appendix C to this subpart, times the representative average unit cost in dollars per kilowatt-hour as provided by the Secretary, plus one-half the product of the per-cycle machine electrical energy consumption for the truncated normal cycle as defined in 1.5 of appendix C to this subpart, determined according to 4.3 of appendix C to this subpart, times the representative average unit cost in dollars per kilowatt-hour as provided by the Secretary plus (B) one-half the product of the per-cycle water energy consumption for gas-heated or oil-heated water for the normal cycle as defined in 1.3 of appendix C to this subpart, in Btu's per cycle, determined according to 4.2 of appendix C to this subpart, times the representative average unit cost in dollars per Btu for gas or oil, as appropriate, as provided by the Secretary, plus one-half the product of the per-cycle water energy consumption for gas-heated or oil-heated water for the truncated normal cycle as defined in

1.5 of appendix C to this subpart, in Btu's per cycle, determined according to 4.2 of appendix C to this subpart, times the representative average unit cost in dollars per Btu for gas or oil, as appropriate, as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(iii) When cold water (50°F) is used, the product of the following three factors:

(A) The representative average use cycle of 322 cycles per year,

(B) One-half the sum of (1) the total per-cycle energy consumption for the normal cycle as defined in 1.3 of appendix C to this subpart plus (2) the truncated normal cycle as defined in 1.5 of appendix C to this subpart, each in kilowatt-hours and determined according to 4.4 of appendix C to this subpart, and

(C) The representative average unit cost in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(3) The energy factor for dishwashers, expressed in cycles per kilowatt-hour shall be—

(i) For dishwashers not having a truncated normal cycle, as defined in 1.5 of appendix C to this subpart, capable of being preset, the reciprocal of the total per cycle energy consumption for the normal cycle in kilowatt-hours per cycle, determined according to 4.4 of appendix C to this subpart, and

(ii) For dishwashers having a truncated normal cycle, as defined in 1.5 of appendix C to this subpart, capable of being preset, the reciprocal of one-half the sum of (A) the total per-cycle energy consumption for the normal cycle plus (B) the total per-cycle energy consumption for the truncated normal cycle, each in kilowatt-hours per cycle and determined according to 4.4 of appendix C to this subpart.

(4) Other useful measures of energy consumption for dishwashers shall be those measures of energy consumption for dishwashers which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix C to this subpart.

Department of Energy

§ 430.23

(d) *Clothes dryers.* (1) The estimated annual operating cost for clothes dryers shall be—

(i) For an electric clothes dryer, the product of the following three factors: (A) The representative average-use cycle of 416 cycles per year, (B) the total per-cycle energy consumption in kilowatt-hours per-cycle, determined according to 4.1 of appendix D to this subpart, and (C) the representative average unit cost in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year, and

(ii) For a gas clothes dryer, the product of the representative average-use cycle of 416 cycles per year times the sum of (A) the product of the gas dryer electric per-cycle energy consumption in kilowatt-hours per cycle, determined according to 4.2 of appendix D to this subpart, times the representative average unit cost in dollars per kilowatt-hour as provided by the Secretary plus (B) the product of the total gas dryer gas energy consumption per cycle, in Btu's per cycle, determined according to 4.5 of appendix D of this subpart, times the representative average unit cost in dollars per Btu as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(2) The energy factor, expressed in pounds of clothes per kilowatt-hour, for clothes dryers shall be either the quotient of a 3-pound bone-dry test load for compact dryers, as defined by 2.6.1 of appendix D to this subpart or the quotient of a 7 pound bone-dry test load for standard dryers, as defined by 2.6.2 of appendix D to this subpart, as applicable, divided by the clothes dryer energy consumption per cycle, as determined according to 4.1 for electric clothes dryers and 4.6 for gas clothes dryers of appendix D to this subpart, the resulting quotient then being rounded off to the nearest hundredth (.01).

(3) Other useful measures of energy consumption for clothes dryers shall be those measures of energy consumption for clothes dryers which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix D to this subpart.

(e) *Water Heaters.* (1) The estimated annual operating cost for water heaters shall be—

(i) For a gas or oil water heater, the product of the annual energy consumption, determined according to section 6.1.8 or 6.2.5 of appendix E of this subpart, times the representative average unit cost of gas or oil, as appropriate, in dollars per Btu as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(ii) For an electric water heater, the product of the annual energy consumption, determined according to section 6.1.8 or 6.2.5 of appendix E of this subpart, times the representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary, divided by 3412 Btu per kilowatt-hour, the resulting quotient then being rounded off to the nearest dollar per year.

(2) The energy factor for the water heaters shall be—

(i) For a gas or oil water heater, as determined by section 6.1.7 or 6.2.4 of appendix E of this subpart rounded off to the nearest 0.01.

(ii) For an electric water heater, as determined by section 6.1.7 or 6.2.4 of appendix E of this subpart rounded off to the nearest 0.01.

(3) Other useful measures of energy consumption for water heaters shall be those measures of energy consumption for water heaters which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix E of this subpart.

(4) The alternative uniform test method for measuring the energy consumption of untested water heaters shall be that set forth in section 7.0 of appendix E of this subpart.

(f) *Room air conditioners.* (1) The estimated annual operating cost for room air conditioners, expressed in dollars per year, shall be determined by multiplying the following three factors: (i) Electrical input power in kilowatts as determined in accordance with 4.2 of appendix F to this subpart, (ii) The representative average-use cycle of 750 hours of compressor operation per year, and (iii) A representative average unit cost of electrical energy in dollars

per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(2) The energy efficiency ratio for room air conditioners, expressed in Btu's per watt-hour, shall be the quotient of: (i) The cooling capacity in Btu's per hour as determined in accordance with 4.1 of appendix F to this subpart divided by: (ii) The electrical input power in watts as determined in accordance with 4.2 of appendix F to this subpart the resulting quotient then being rounded off to the nearest 0.1 Btu per watt-hour.

(3) The average annual energy consumption for room air conditioners, expressed in kilowatt-hours per year, shall be determined by multiplying together the following two factors: (i) Electrical input power in kilowatts as determined in accordance with 4.2 of appendix F to this subpart, and (ii) A representative average use cycle of 750 hours of compressor operation per year, the resulting product then being rounded off to the nearest kilowatt-hour per year.

(4) Other useful measures of energy consumption for room air conditioners shall be those measures of energy consumption which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix F to this subpart.

(g) *Unvented home heating equipment.*

(1) The estimated annual operating cost for primary electric heaters, shall be the product of: (i) The average annual electric energy consumption in kilowatt-hours per year, determined according to section 3.1 of appendix G of this subpart and (ii) the representative average unit cost in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting product then being rounded off to the nearest dollar per year.

(2) The estimated regional annual operating cost for primary electric heaters, shall be the product of: (i) The regional annual electric energy consumption in kilowatt-hours per year for primary heaters determined according to section 3.2 of appendix G of this subpart and (ii) the representative average unit cost in dollars per kilowatt-hour

as provided pursuant to section 323(b)(2) of the Act, the resulting product then being rounded off to the nearest dollar per year.

(3) The estimated operating cost per million Btu output shall be—

(i) For primary and supplementary electric heaters and unvented gas and oil heaters without an auxiliary electric system, the product of: (A) One million; and (B) the representative unit cost in dollars per Btu for natural gas, propane, or oil, as provided pursuant to section 323(b)(2) of the Act as appropriate, or the quotient of the representative unit cost in dollars per kilowatt-hour, as provided pursuant to section 323(b)(2) of the Act, divided by 3,412 Btu per kilowatt hour, the resulting product then being rounded off to the nearest 0.01 dollar per million Btu output; and

(ii) For unvented gas and oil heaters with an auxiliary electric system, the product of: (A) The quotient of one million divided by the rated output in Btu's per hour as determined in 3.4 of appendix G of this subpart; and (B) the sum of: (1) The product of the maximum fuel input in Btu's per hour as determined in 2.2. of this appendix times the representative unit cost in dollars per Btu for natural gas, propane, or oil, as appropriate, as provided pursuant to section 323(b)(2) of the Act, plus (2) the product of the maximum auxiliary electric power in kilowatts as determined in 2.1 of appendix G of this subpart times the representative unit cost in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting quantity shall be rounded off to the nearest 0.01 dollar per million Btu output.

(4) The rated output for unvented heaters is the rated output as determined according to either sections 3.3 or 3.4 of appendix G of this subpart, as appropriate, with the result being rounded to the nearest 100 Btu per hour.

(5) Other useful measures of energy consumption for unvented home heating equipment shall be those measures of energy consumption for unvented home heating equipment which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from

Department of Energy

§ 430.23

the application of appendix G of this subpart.

(h) *Television sets.* (1) The estimated average annual operating cost for television sets shall be the product of:

(i) The average annual energy consumed by the television set in kilowatt-hours per year, determined according to 3.0 of appendix H of this subpart, and

(ii) The representative average unit cost of energy in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(2) The receiver energy efficiency factor for television sets shall be:

(i) For color television sets, the product of the estimated minimum power requirement (.130 kilowatts) and the average annual hours of use (2,200 hr/yr.), divided by the average annual energy consumed by the television set in kilowatt-hours per year, determined according to 3.0 of appendix H to this subpart. The resultant is then multiplied by 100 and expressed as a percent.

(ii) For monochrome television sets, the product of the estimated minimum power requirement (.040 kilowatts) and the average annual hours of use (2,200 hr/yr.), divided by the average annual energy consumed by the television set in kilowatt-hours per year determined according to 3.0 of appendix H of this subpart. The result is then multiplied by 100 and expressed as a percent.

(3) Other useful measures of energy consumption for television sets shall be those measures of energy consumption for television sets which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix H of this subpart.

(i) *Kitchen ranges and ovens.* (1) The estimated annual operating cost for conventional ranges, conventional cooking tops, conventional ovens, microwave ovens, and microwave/conventional ranges shall be the sum of the following products: (i) The total annual electrical energy consumption for any electrical energy usage, in kilowatt-hours (kWh's) per year, times the representative average unit cost for electricity, in dollars per kWh, as provided pursuant to section 323(b)(2) of the Act; plus (ii) the total annual gas

energy consumption for any natural gas usage, in British thermal units (Btu's) per year, times the representative average unit cost for natural gas, in dollars per Btu, as provided pursuant to section 323(b)(2) of the Act; plus (iii) the total annual gas energy consumption for any propane usage, in Btu's per year, times the representative average unit cost for propane, in dollars per Btu, as provided pursuant to section 323(b)(2) of the Act. The total annual energy consumption for conventional ranges, conventional cooking tops, conventional ovens, microwave ovens, and microwave/conventional ranges shall be as determined according to 4.3.1, 4.2.2, 4.1.2.5 or 4.1.2.6, 4.4.3, and 4.5.1.3, respectively, of appendix I to this subpart. The estimated annual operating cost shall be rounded off to the nearest dollar per year, except for microwave ovens, for which the estimated annual operating cost shall be rounded off to the nearest one-quarter of a dollar per year.

(2) The cooking efficiency for conventional cooking tops, conventional ovens, and microwave ovens shall be the ratio of the cooking energy output for the test to the cooking energy input for the test, as determined according to 4.2.1.3, 4.1.3 and 4.4.2, respectively, of appendix I to this subpart. The final cooking efficiency values shall be rounded off to three significant digits.

(3) The cooking efficiency for conventional ranges, and microwave/conventional ranges shall be determined according to 4.3.2 and 4.5.2, respectively, of appendix I to this subpart, which weights the cooking efficiencies of the major cooking components of the range. The final cooking efficiency values shall be rounded off to three significant digits.

(4) The energy factor for conventional ranges, conventional cooking tops, conventional ovens, microwave ovens, and microwave/conventional ranges shall be the ratio of the annual useful cooking energy output to the total annual energy input, as determined according to 4.3.3, 4.2.3, 4.1.4, 4.4.4 and 4.5.3, respectively, of Appendix I to this subpart. The final energy factor values shall be rounded off to three significant digits.

(5) There shall be two estimated annual operating costs, two cooking efficiencies, and two energy factors for convertible cooking appliances—(i) an estimated annual operating cost, a cooking efficiency and an energy factor which represent values for those three measures of energy consumption for the operation of the appliance with natural gas; and (ii) an estimated annual operating cost, a cooking efficiency and an energy factor which represent values for those three measures of energy consumption for the operation of the appliance with LP-gas.

(6) The estimated annual operating cost for convertible cooking appliances which represents natural gas usage, as described in paragraph (i)(5)(i) of this section, shall be determined according to paragraph (i)(1) of this section using the total annual gas energy consumption for natural gas times the representative average unit cost for natural gas.

(7) The estimated annual operating cost for convertible cooking appliances which represents LP-gas usage, as described in paragraph (i)(5)(ii) of this section, shall be determined according to paragraph (i)(1) of this section using the representative average unit cost for propane times the total annual energy consumption of the test gas, either propane or natural gas.

(8) The cooking efficiency for convertible cooking appliances which represents natural gas usage, as described in paragraph (i)(5)(i) of this section, shall be determined according to paragraphs (i)(2) and (i)(3) of this section when the appliance is tested with natural gas.

(9) The cooking efficiency for convertible cooking appliances which represents LP-gas usage, as described in paragraph (i)(5)(ii) of this section, shall be determined according to paragraphs (i)(2) and (i)(3) of this section, when the appliance is tested with either natural gas or propane.

(10) The energy factor for convertible cooking appliances which represents natural gas usage, as described in paragraph (i)(5)(i) of this section, shall be determined according to paragraph (i)(4) of this section when the appliance is tested with natural gas.

(11) The energy factor for convertible cooking appliances which represents LP-gas usage, as described in paragraph (i)(5)(ii) of this section, shall be determined according to paragraph (i)(4) of this section when the appliance is tested with either natural gas or propane.

(12) Other useful measures of energy consumption for conventional ranges, conventional cooking tops, conventional ovens, microwave ovens and microwave/conventional ranges shall be those measures of energy consumption which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix I to this subpart.

(j) *Clothes washers.* (1) The estimated annual operating cost for automatic and semi-automatic clothes washers shall be—

(i) When electrically heated water is used, the product of the following three factors: (A) The representative average-use cycle of 416 cycles per year, (B) the total per-cycle energy consumption for the normal cycle in kilowatt-hours per cycle determined according to 4.6 of appendix J to this subpart, and (C) the representative average unit cost in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year, and

(ii) When gas-heated or oil-heated water is used, the product of: the representative average-use cycle of 416 cycles per year and the sum of both (A) the product of the per-cycle machine electrical energy consumption for the normal cycle in kilowatt-hours per cycle, determined according to 4.4 of appendix J to this subpart, and the representative average unit cost in dollars per kilowatt-hour as provided by the Secretary and (B) the product of the per-cycle water energy consumption for gas-heated or oil-heated water for the normal cycle, in Btu per cycle, determined according to 4.5 of appendix J to this subpart, and the representative average unit cost in dollars per Btu for oil or gas, as appropriate, as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

(2) The energy factor for automatic and semi-automatic clothes washers shall be the quotient of the cubic foot capacity of the clothes container as determined in 3.1 of appendix J to this subpart divided by the clothes washer energy consumption per cycle, expressed as the sum of the machine electrical energy consumption and the maximum normal water energy consumption as determined in 4.4 and 4.3, respectively, of appendix J to this subpart. The resulting be rounded off to the nearest 0.01 cubic foot per kilowatt-hour.

(3) Other useful measures of energy consumption for automatic or semi-automatic clothes washers shall be those measures of energy consumption which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix J to this subpart.

(k)—(l) [Reserved]

(m) *Central Air Conditioners.* (1) The estimated annual operating cost for cooling-only units and air-source heat pumps shall be one of the following:

(i) For cooling-only units or the cooling portion of the estimated annual operating cost for air-source heat pumps which provide both heating and cooling, the product of: (A) The quotient of the cooling capacity, in Btu's per hour, determined from the steady-state wet-coil test (Test A) measured at the highest compressor speed, as described in section 3.1 of appendix M to this subpart, divided by the seasonal energy efficiency ratio, in Btu's per watt-hour, determined from section 5.1 of appendix M to this subpart; (B) the representative average use cycle for cooling of 1,000 hours per year; (C) a conversion factor of 0.001 kilowatt per watt; and (D) the representative average unit cost of electricity in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting product then being rounded off to the nearest dollar per year;

(ii) For air-source heat pumps which provide only heating or the heating portion of the estimated annual operating cost for air-source heat pumps which provide both heating and cooling, the product of: (A) The quotient of the standardized design heating re-

quirement, in Btu's per hour, nearest to the capacity measured in the high temperature test, determined in sections 5.2 and 6.2.6 of appendix M to this subpart, divided by the heating seasonal performance factor, in Btu's per watt-hour, calculated for heating region IV corresponding to the above mentioned standardized design heating requirement determined from section 5.2 of appendix M to this subpart; (B) the representative average use cycle for heating of 2,080 hours per year; (C) the adjustment factor of 0.77 which serves to adjust the calculated design heating requirement and heating load hours to the actual load experienced by a heating system; (D) a conversion factor of 0.001 kilowatt per watt; and (E) the representative average unit cost of electricity in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting product then being rounded off to the nearest dollar per year; or

(iii) For air-source heat pumps which provide both heating and cooling, the estimated annual operating cost is the sum of the quantity determined in paragraph (m)(1)(i) of this section added to the quantity determined in paragraph (m)(1)(ii) of this section.

(2) The estimated regional annual operating cost for cooling-only units and for air-source heat pumps shall be one of the following:

(i) For cooling-only units or the cooling portion of the estimated regional annual operating cost for air-source heat pumps which provide both heating and cooling, the product of: (A) The quotient of the cooling capacity, in Btu's per hour, determined from the steady-state wet-coil test (Test A) measured at the highest compressor speed, as described in section 3.1 of appendix M to this subpart, divided by the seasonal energy efficiency ratio, in Btu's per watt-hour, determined from section 5.1 of appendix M to this subpart; (B) the estimated number of regional cooling load hours per year determined from section 6.1.3 of appendix M to this subpart; (C) a conversion factor of 0.001 kilowatts per watt; and (D) the representative average unit cost of electricity in dollars per kilowatt-hour as provided pursuant to section

323(b)(2) of the Act, the resulting product then being rounded off to the nearest dollar per year;

(ii) For air-source heat pumps which provide only heating or the heating portion of the estimated regional annual operating cost for air-source heat pumps which provide both heating and cooling, the product of: (A) The quotient of the standardized design heating requirement, in Btu's per hour, nearest to the capacity measured in the high temperature test (Test A), determined in sections 5.2 and 6.2.6 of appendix M to this subpart, divided by the heating seasonal performance factor, in Btu's per watt-hour, calculated for the appropriate region of interest and corresponding to the above mentioned standardized design heating requirement determined from section 5.2 of appendix M to this subpart; (B) the estimated number of regional heating load hours per year determined from section 6.2.5 of appendix M to this subpart; (C) the adjustment factor of 0.77 which serves to adjust the calculated design heating requirement and heating load hours to the actual load experienced by a heating system; (D) a conversion factor of 0.001 kilowatts per watt; and (E) the representative average unit cost of electricity in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting product then being rounded off to the nearest dollar per year; or

(iii) For air-source heat pumps which provide both heating and cooling, the estimated regional annual operating cost is the sum of the quantity determined in paragraph (m)(3)(i) of this section added to the quantity determined in paragraph (m)(3)(ii) of this section.

(3) The measure(s) of efficiency for cooling-only units and air-source heat pumps shall be one or more of the following:

(i) The seasonal energy efficiency ratio for cooling-only units and air-source heat pumps which provide cooling shall be the seasonal energy efficiency ratio, in Btu's per watt-hour, determined according to section 5.1 of appendix M to this subpart, rounded off to the nearest 0.05.

(ii) The heating seasonal performance factors for air-source heat pumps

shall be the heating seasonal performance factors, in Btu's per watt-hour, determined according to section 5.2 of appendix M to this subpart for each applicable standardized design heating requirement within each climatic region, rounded off to the nearest 0.05.

(iii) The annual performance factors for air-source heat pumps which provide heating and cooling, shall be the annual performance factors, in Btu's per watt-hour, determined according to section 5.3 of appendix M to this subpart for each standardized design heating requirement within each climatic region, rounded off to the nearest 0.05.

(4) Other useful measures of energy consumption for central air conditioners shall be those measures of energy consumption which the Secretary of Energy determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix M to this subpart.

(5) After September 12, 1988, all measures of energy consumption shall be determined by the test method as set forth in appendix M to this subpart; or by an alternate rating method set forth in § 430.23(m)(4) as approved by the Assistant Secretary for Conservation and Renewable Energy in accordance with § 430.23(m)(5).

(n) *Furnaces.* (1) The estimated annual operating cost for furnaces is the sum of: (i) The product of the average annual fuel energy consumption, in Btu's per year for gas or oil furnaces or in kilowatt-hours per year for electric furnaces, determined according to section 4.8 or 4.10 of appendix N of this subpart, respectively, and the representative average unit cost in dollars per Btu for gas or oil, or dollars per kilowatt-hour for electric, as appropriate, as provided pursuant to section 323(b)(2) of the Act, plus (ii) the product of the average annual auxiliary electric energy consumption in kilowatt-hours per year determined according to section 4.9 of appendix N of this subpart, and the representative average unit cost in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting sum then being rounded off to the nearest

Department of Energy

§ 430.23

dollar per year. (For furnaces which operate with variable inputs, an estimated annual operating cost is to be calculated for each degree of oversizing specified in section 4 of appendix N of this subpart.)

(2) The annual fuel utilization efficiency for furnaces, expressed in percent, is the ratio of annual fuel output of useful energy delivered to the heated space to the annual fuel energy input to the furnace determined according to section 4.6 of appendix N of this subpart for gas and oil furnaces and determined in accordance with section 4.1 of appendix N of this subpart for electric furnaces.

(3) The estimated regional annual operating cost for furnaces is the sum of: (i) The product of the regional annual fuel energy consumption in Btu's per year for gas or oil furnaces or in kilowatt-hours per year for electric furnaces, determined according to section 4.11 or 4.13 of appendix N of this subpart, respectively, and the representative average unit cost in dollars per Btu for gas or oil, or dollars per kilowatt-hour for electric, as appropriate, as provided pursuant to section 323(b)(2) of the Act, plus (ii) the product of the regional annual auxiliary electrical energy consumption in kilowatt-hours per year, determined according to section 4.12 of appendix N of this subpart, and the representative average unit cost in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act, the resulting sum then being rounded off to the nearest dollar per year.

(4) The energy factor for furnaces, expressed in percent, is the ratio of annual fuel output of useful energy delivered to the heated space to the total annual energy input to the furnace determined according to section 4.14 of appendix N of this subpart.

(5) Other useful measures of energy consumption for furnaces shall be those measures of energy consumption which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix N of this subpart.

(o) *Vented home heating equipment.*

(1) The annual fuel utilization efficiency for vented home heating equip-

ment, expressed in percent, which is the ratio of the annual fuel output of useful energy delivered to the heated space to the annual fuel energy input to the vented heater, shall be determined either according to section 4.1.17 of appendix O of this subpart for vented heaters without either manual controls or thermal stack dampers; according to section 4.2.6 of appendix O of this subpart for vented heaters equipped with manual controls; or according to section 4.3.7 of appendix O of this subpart for vented heaters equipped with thermal stack dampers.

(2) The estimated operating cost per million Btu output for vented heaters without an auxiliary electric system shall be the product of: (i) One hundred; (ii) the quotient of one million Btu output divided by the annual fuel utilization efficiency as determined in paragraph (o) (1) and (iii) the representative unit cost in dollars per Btu for natural gas, propane, or oil, as appropriate, as provided pursuant to section 323(b)(2) of the Act, the resulting product shall be rounded to the nearest 0.01 dollar per million Btu output.

(3) The estimated operating cost per million Btu output for gas or oil vented home heating equipment with an auxiliary electric system shall be the product of: (A) The quotient of one million Btu divided by the sum of: (1) The product of the maximum fuel input in Btu's per hour as determined in 3.1.1 or 3.1.2 of appendix O of this subpart times the annual fuel utilization efficiency in percent as determined in 4.1.17, 4.2.6, or 4.3.7 of this appendix as appropriate divided by 100, plus (2) the product of the maximum electric power in watts as determined in 3.1.3 of appendix O of this subpart times the quantity 3.412; and (B) of the sum of: (1) the product of the maximum fuel input in Btu's per hour as determined in 3.1.1 of this appendix times the representative unit cost in dollars per Btu for natural gas, propane, or oil, as appropriate, as provided pursuant to section 323(b)(2) of the Act; plus (2) the product of the maximum auxiliary electric power in kilowatts as determined in 3.1.3 of appendix O of this subpart times the representative unit cost in dollars per kilowatt-hour as provided pursuant to section

323(b)(2) of the Act, the resulting quantity shall be rounded off to the nearest 0.01 dollar per million Btu output.

(4) Other useful measures of energy consumption for vented home heating equipment shall be those measures of energy consumption which the Secretary determines are likely to assist consumers in making purchasing decisions and which are derived from the application of appendix O of this subpart.

(p) *Pool heaters.* (1) The estimated annual operating cost (space reserved).

(2) The thermal efficiency of pool heaters, expressed as a percent, shall be determined in accordance with section 4 of appendix P to this subpart.

(q) *Fluorescent Lamp Ballasts.* (1) The Estimated Annual Energy Consumption (EAEC) for fluorescent lamp ballasts, expressed in kilowatt-hours per year, shall be the product of: (i) The input power in kilowatts as determined in accordance with section 3.3.1 of appendix Q to this subpart and (ii) the representative average use cycle of 1,000 hours per year, the resulting product then being rounded off to the nearest kilowatt-hour per year.

(2) Ballast Efficacy Factor (BEF) shall be as determined in section 4.2 of appendix Q of this subpart.

(3) The Estimated Annual Operating Cost (EAOC) for fluorescent lamp ballasts, expressed in dollars per year, shall be the product of: (i) The representative average unit energy cost of electricity in dollars per kilowatt-hour as provided by the Secretary, (ii) the representative average use cycle of 1,000 hours per year, and (iii) the input power in kilowatts as determined in accordance with section 3.3.1 of appendix Q to this subpart, the resulting product then being rounded off to the nearest dollar per year.

(4) Other useful measures which may be applicable. [Reserved]

(r) *General Service Fluorescent Lamps and General Service Incandescent Lamps.*

(1) The Estimated Annual Energy Consumption for lamps defined in § 430.2, expressed in kilowatt-hours per year, shall be the product of:

(i) The input power in kilowatts as determined in accordance with section 4 of Appendix R to this subpart and

(ii) The representative average use cycle of 1,000 hours per year, the resulting product then being rounded off to the nearest kilowatt-hour per year.

(2) The Lamp Efficacy for general service fluorescent lamps and medium base compact fluorescent lamps defined in section 430.2 shall be the quotient of the average lumen output and the average lamp wattage as determined in section 4 of Appendix R of this subpart with the resulting quotient rounded off to the nearest lumen per watt.

(3) The Lamp Efficacy for general service incandescent lamps and incandescent reflector lamps shall be the quotient of the average lumen output and the average lamp wattage as determined in section 4 of Appendix R of this subpart with the resulting quotient rounded off to the nearest tenth of a lumen per watt.

(4) The Estimated Annual Operating Cost for lamps defined in § 430.2, expressed in dollars per year, shall be the product of: (i) The representative average unit energy cost of electricity in dollars per kilowatt-hour as provided by the Secretary, (ii) The representative average use cycle of 1,000 hours per year, and (iii) The input power in kilowatts as determined in accordance with section 4 of Appendix R to this subpart, the resulting product then being rounded off to the nearest dollar per year.

(5) The Color Rendering Index of a general service fluorescent lamp shall be tested and determined in accordance with section 4.5 of Appendix R of this subpart and rounded off to the nearest unit.

[42 FR 27898, June 1, 1977]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 430.23, see the List of CFR Sections Affected in the Finding Aids section of this volume.

§ 430.24 Units to be tested.

When testing of a covered product is required to comply with section 323(c) of the Act, or to comply with rules prescribed under sections 324 or 325 of the Act, a sample shall be selected and tested comprised of units which are production units, or are representative of production units of the basic model being tested, and shall meet the following applicable criteria.